Environmental Technology Verification

Test Report of Mobile Source Emission Control Devices

PUREM North America, LLC
PMF GreenTec 1004205.00.0 Diesel Particulate Filter

Prepared by

Southwest Research Institute

RTI International

Under a Cooperative Agreement with
U.S. Environmental Protection Agency

THE ENVIRONMENTAL TECHNOLOGY VERIFICATION PROGRAM

U.S. Environmental Protection Agency

ETV Joint Verification Statement

TECHNOLOGY TYPE:	**MOBILE DIESEL ENGINE AIR POLLUTION CONTROL**
APPLICATION:	**CONTROL OF EMISSIONS FROM MOBILE DIESEL ENGINES IN HIGHWAY USE BY DIESEL OXIDATION CATALYSTS AND DIESEL PARTICULATE FILTERS**
TECHNOLOGY NAME:	**PMF GREENTEC 1004205.00.0**
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The U.S. Environmental Protection Agency (EPA) has created the Environmental Technology Verification (ETV) Program to facilitate the deployment of innovative or improved environmental technologies through performance verification and dissemination of information. The goal of the ETV Program is to further environmental protection by accelerating the acceptance and use of improved and cost-effective technologies. ETV seeks to achieve this goal by providing high-quality, peer-reviewed data on technology performance to those involved in the design, distribution, financing, permitting, purchase, and use of environmental technologies.

ETV works in partnership with recognized standards and testing organizations; stakeholder groups, which consist of buyers, vendor organizations, permitters, and other interested parties; and with the full participation of individual technology developers. The program evaluates the performance of innovative technologies by developing test plans that are responsive to the needs of stakeholders, conducting field or laboratory tests (as appropriate), collecting and analyzing data, and preparing peer-reviewed reports. All evaluations are conducted in accordance with rigorous quality assurance (QA) protocols to ensure that data of known and adequate quality are generated and that the results are defensible.

The Air Pollution Control Technology Verification Center (APCT Center), one of six centers under the ETV Program, is operated by RTI International (RTI), in cooperation with EPA's National Risk Management Research Laboratory. The APCT Center has evaluated the performance of an emissions control system consisting of a precious metal diesel oxidation catalyst and diesel particulate filter for highway diesel engines.

ETV TEST DESCRIPTION

All tests were performed in accordance with the *Test/QA Plan for the Verification Testing of Diesel Exhaust Catalysts, PM Filters, and Engine Modification Technologies for Highway and Nonroad Use Diesel Engines* and the *Test-Specific Addendum to ETV Mobile Source Test/QA Plan for PUREM North America LLC for the PMF GreenTec system*. These documents are written in accordance with the applicable generic verification protocol and include requirements for quality management, QA, procedures for product selection, auditing of the test laboratories, and test reporting format.

The mobile diesel engine air pollution control technology was tested at Southwest Research Institute. The performance verified was the percentage emission reduction achieved by the technology for particulate matter (PM), nitrogen oxides (NO_x), hydrocarbons (HC), and carbon monoxide (CO) relative to the performance of the same baseline engine without the technology in place. Operating conditions were documented and ancillary performance measurements were also made. A summary description of the ETV test is provided in Table 1.

Table 1. Summary Description of the ETV Test

Test type	Highway Transient Federal Test Procedure (FTP)
Engine family	XNVXH07.3ANE
Engine make–model year	Navistar – 1999 model DT466-B250F
Service class	Highway, heavy-duty diesel engine
Engine rated power	250 hp @ 2600 rpm
Engine displacement	7.3 L, eight-cylinder
Technology	PMF GreenTec 1004205.00.0
Technology description	Precious metal oxidation catalyst plus a powdered metal particulate matter filter.
Test cycle or mode description	One cold-start and three hot-start tests according to FTP test
Test fuel description	Ultra-low-sulfur diesel (ULSD) fuel with 15 ppm sulfur maximum
Critical measurements	PM, NO_x, HC, and CO
Ancillary measurements	CO_2, NO, NO_2 (by calculation), soluble organic fraction (SOF) of PM, exhaust backpressure, exhaust temperature, and fuel consumption

VERIFIED TECHNOLOGY DESCRIPTION

The PUREM PMF GreenTec 1004205.00.0 is a precious metal oxidation catalyst plus a powdered metal particulate matter filter. This verification statement describes the performance of the tested technology on the diesel engine and fuels identified in Table 1, and applies only to the use of the PMF GreenTec 1004205.00.0 on highway engines fueled by ULSD (15 ppm or less) fuel.

VERIFICATION OF PERFORMANCE

The PMF GreenTec 1004205.00.0 achieved the reduction in tailpipe emissions shown in Table 2 compared to baseline operation without the PMF GreenTec system.

Table 2. Verified Emissions Reductions

Device type	Fuel	Mean Emissions Reduction (%)				95% Confidence Limits on the Emissions Reduction (%)			
		PM	NOx	HC	CO	PM	NOx	HC	CO
Degreened	ULSD	94	2.1	97	85	91 to 97	– [a]	– [b]	73 to 97
Aged	ULSD	95	2.8	93	86	92 to 98	1.1 to 4.4	– [b]	74 to 98

[a] The emission reduction cannot be distinguished from zero with 95% confidence.
[b] The emissions reduction could not be quantified or distinguished from 100% with 95% confidence.

The APCT Center QA officer has reviewed the test results and quality control data and has concluded that the data quality objectives given in the generic verification protocol and test/QA plan have been attained. EPA and APCT Center QA staff have conducted technical assessments of the test laboratory and of the data handling. These assessments confirm that the ETV tests were conducted in accordance with the EPA-approved test/QA plan.

This verification statement verifies the emissions characteristics of the *PMF GreenTec 1004205.00.0* for the stated application. Extrapolation outside that range should be done with caution and an understanding of the scientific principles that control the performance of the technology. This verification focuses on emissions. Potential technology users may obtain other types of performance information from the manufacturer.

In accordance with the generic verification protocol, this verification statement is valid, commencing on the date below, indefinitely for application of the *PMF GreenTec 1004205.00.0* within the range of applicability of the statement.

Original signed by S. Gutierrez *4/4/07*

Sally Gutierrez Date
Director
National Risk Management Research Laboratory
Office of Research and Development
United States Environmental Protection Agency

Original signed by A. R. Trenholm *3/28/07*

Andrew R. Trenholm Date
Director
Air Pollution Control Technology
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